

## LIVERMORE LAB REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory March 21-28, 2014.

### CONTRA COSTA TIMES LEADING THE WAY



**William Goldstein, the Lab's new director.**

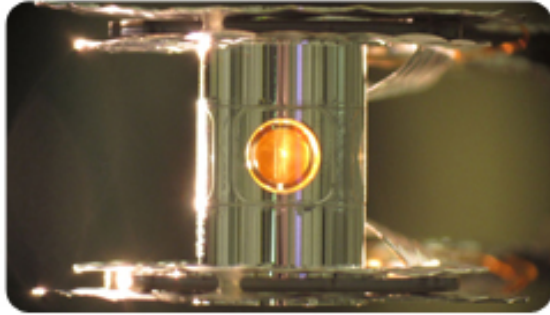
William Goldstein has been appointed the 12th director in the history of Lawrence Livermore National Laboratory.

A physicist with 29 years of experience at the Lab, Goldstein has served as the Lab's deputy director of science and technology since 2012. He will start in the new job Monday, March 31.

With his hiring, Goldstein also will serve as president of Lawrence Livermore National Security (LLNS), a public-private consortium that manages lab operations. He replaces Parney Albright, who resigned as director in October, and interim director Bret Knapp, who served for five months.

To read more, go to the [Contra Costa Times](#).

**Newsweek** A STEP TOWARD IGNITION



**A metallic case called a hohlraum holds the fuel capsule for NIF experiments.**

Researchers at Lawrence Livermore's National Ignition Facility recently achieved a breakthrough on the road to fusion, the same energy that powers the sun and stars, by achieving fuel gains greater than 1.

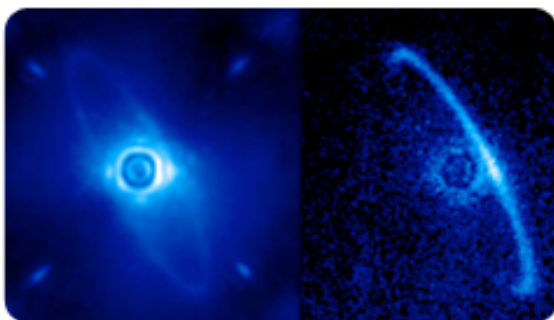
In a series of experiments, scientists attained fuel gains that showed an order of magnitude improvement in yield performance over past experiments.

The experimental results have matched computer simulations much better than previous experiments, providing an important benchmark for the models used to predict the behavior of matter under conditions similar to those generated during a nuclear explosion. NIF's primary goal is to ensure the safety and security of the nuclear stockpile.

To read more, go to [Newsweek](#).



**WE MAY NOT BE ALONE**



**Gemini Planet Imager's first-light image of the light scattered by a disk of dust orbiting the young star HR4796A**

Out of this world first light images have emerged from the Gemini Planet Imager. They are the first of what will turn out to be images of distant worlds in unprecedented detail.

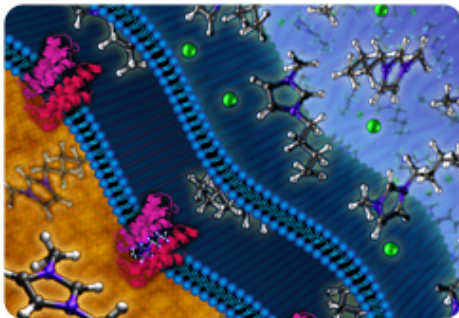
"In one minute, we are seeing planets that used to take us an hour to detect," says Bruce Macintosh formerly of the Lawrence Livermore National Laboratory, who led the team that built the instrument.

After nearly a decade of development, construction and testing, the world's most advanced instrument for directly imaging and analyzing planets around other stars is pointing skyward and collecting light from alien planets.

To read more, go to [The Daily Galaxy](#).



**RESISTANCE IS NOT FUTILE**



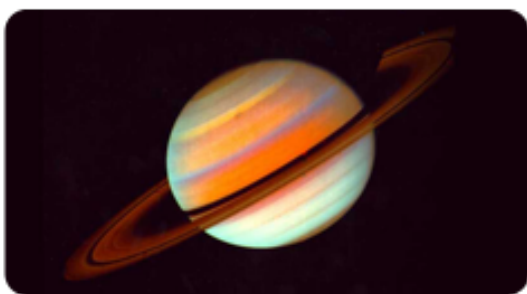
**Lawrence Livermore researchers discovered a resistance mechanism in a rainforest soil bacterium that enables *E. coli* to grow and produce biofuel in the presence of ionic liquids (molten salt) at levels that are otherwise toxic to native strains.**

New research by scientists from Lawrence Livermore, in conjunction with the Joint BioEnergy Institute (JBEI), suggests that a type of bacterial resistance may provide more efficient production of biofuels.

The team identified the genetic origin of bacterial resistance to an ionic liquid (a molten salt), which they successfully introduced into a strain of *E. coli* bacteria for the production of advanced biofuels. The ionic liquid resistance is based on a pair of genes discovered in a microbial species native to a tropical rainforest in Puerto Rico.

"Ionic liquids are used as potent solvents to extract cellulose from biomass, so that it can be broken down to sugars used by microbes to make advanced biofuels – new liquid fuels that go beyond ethanol and can replace gasoline or diesel," said Michael Thelen, an LLNL biochemist who also is part of JBEI's Deconstruction Division.

To read more, go to [Bioscience Technology](#).



**LLNL researchers have taken a peak into the lower atmospheric layers of giant gas planets such as Saturn.**

Lawrence Livermore researchers recently were part of a team that took a sneak peek deep into the lower atmospheric layers of giant gas planets such as Jupiter or Saturn.

Their observations reveal how liquid hydrogen becomes a plasma and provide information on the material's thermal conductivity and its internal energy exchange, which are important ingredients for planetary models.

The atmosphere of gas giants mainly consists of hydrogen, which is the most abundant chemical element in the universe.

The researchers decided to use liquid hydrogen as a sample of the planetary atmosphere since it has a similar mass density as the lower atmosphere of giant gas planets. The scientists used DESY's X-ray laser FLASH to heat the liquid hydrogen almost instantaneously, from minus 253 to around 12,000 degrees Celsius and simultaneously observed the characteristics of the heating process through the increase of the X-ray scattering signal.

To read more, go to [Space Daily](#).

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LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance. To send input to the *Livermore Lab Report*, send [e-mail](#)